

CLAIMS:

1. A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within
 5 the interior and comprising:

a bench arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; and

an air handling system comprising:

10 an air intake plenum having at least one air intake,
 a fan connected to the plenum,
 an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

and at least one air conditioning component for conditioning the
 15 air transported from the plenum to the duct by the fan;

the plenum including at least a part thereof mounted underneath the bench and forming at least a part of a support for the bench.

2. The system according to Claim 1 including a plurality of benches wherein each bench has associated therewith a respective plenum and a
 20 respective fan and wherein at least a part of the plenum associated therewith is mounted underneath the bench and forming at least a part of a support for the bench.

3. The system according to Claim 2 wherein the part of the plenum under the bench defines a rectangular housing arranged for supporting a horizontal bench top.

4. The system according to Claim 3 wherein the horizontal bench top is slidable side to side across the housing.

5. The system according to Claim 3 wherein the horizontal bench top is tiltable about a horizontal axis longitudinally along the housing

6. The system according to Claim 1 wherein the duct includes a vertical duct section at one end of the bench.

10 7. The system according to Claim 6 wherein the duct includes a horizontal discharge duct section connected to the vertical duct section and extending over the bench for discharging the air therefrom downwardly onto the bench.

8. The system according to Claim 7 wherein the horizontal duct section comprises a flexible tube shaped to form an elliptical cross section which is wider than it is high.

9. The system according to Claim 1 wherein the plenum underneath the bench contains at least one heating coil for heating the air.

10. The system according to Claim 1 wherein the plenum underneath the bench contains at least one cooling coil for cooling the air.

11. The system according to Claim 10 wherein the plenum underneath the bench includes at least two inlets and wherein there is provided a cooling coil at each of the inlets.

12. The system according to Claim 11 wherein supply of cooling
5 fluid to each of the coils is controlled by a cooling system which is arranged to effect sub-cooling at one of the coils for de-humidifying the air.

13. The system according to Claim 1 wherein the fan is located in a fan housing at one end of the bench.

14. The system according to Claim 1 wherein there is provided an
10 air flow connection which is arranged to communicate with one sidewall of the exterior wall structure at one end of the bench.

15. The system according to Claim 1 wherein the plenum underneath the bench has two inlets one at each side and one at an end.

16. The system according to Claim 1 wherein the plenum
15 underneath the bench contains fogging nozzles for applying water droplets to the air.

17. The system according to Claim 16 wherein the fogging nozzles are supplied with water under pressure from a fogging water supply system including a water pump operable to supply water under pressure to an accumulator tank having a gas membrane, the tank being arranged to supply the water under
20 pressure to the nozzles and including a pressure control valve arranged to operate the pump to maintain the pressure within the tank between upper and lower

pressure limits so as operate the pump only when the lower pressure limit is reached.

18. A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to
5 an interior of natural light, the system being arranged for conditioning the air within the interior and comprising:

a bench arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; and

10 an air handling system comprising:

an air intake plenum having at least one air intake,

a fan connected to the plenum,

an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

15 and at least one air conditioning component for conditioning the air transported from the plenum to the duct by the fan;

wherein the plenum includes at least two inlets and wherein there is provided at each of the inlets within the duct a cooling coil for cooling the air;

and wherein the supply of cooling fluid to each of the coils is controlled
20 by a cooling system which is arranged to effect sub-cooling at one of the coils for de-humidifying the air.

19. A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within the interior and comprising:

5 a bench arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; and

an air handling system comprising:

an air intake plenum having at least one air intake,

10 a fan connected to the plenum,

an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

and at least one air conditioning component for conditioning the air transported from the plenum to the duct by the fan;

15 wherein the plenum contains fogging nozzles for applying water droplets to the air;

and wherein the fogging nozzles are supplied with water under pressure from a fogging water supply system including a water pump operable to supply water under pressure to an accumulator tank having a gas membrane, the
20 tank being arranged to supply the water under pressure to the nozzles and including a pressure control valve arranged to operate the pump to maintain the pressure

within the tank between upper and lower pressure limits so as operate the pump only when the lower pressure limit is reached.

20. A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within the interior and comprising:

a plurality of benches each arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; and

10 a plurality of air handling systems each comprising:

an air intake plenum having at least one air intake,

a fan connected to the plenum,

an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

15 and at least one air conditioning component for conditioning the air transported from the plenum to the duct by the fan;

the plurality of air handling systems being equal in number to the plurality of elongate benches such that each bench has associated therewith a respective one of the air handling systems.

20 21. The system according to Claim 20 wherein the duct of each of the air handling systems includes a vertical duct section at one end of the respective bench.

22. The system according to Claim 21 wherein the duct of each of the air handling systems includes a horizontal discharge duct section connected to the vertical duct section and extending over the bench for discharging air downwardly onto the bench.

5 23. The system according to Claim 22 wherein the horizontal duct section comprises a flexible tube shaped to form an elliptical cross section which is wider than it is high.

24. The system according to Claim 20 wherein each plenum contains at least one heating coil for heating the air.

10 25. The system according to Claim 20 wherein each plenum contains at least one cooling coil for cooling the air.

26. The system according to Claim 20 wherein each plenum includes at least two inlets and wherein there is provided a cooling coil at each of the inlets.

15 27. The system according to Claim 26 wherein supply of cooling fluid to each of the coils is controlled by a cooling system which is arranged to effect sub-cooling at one of the coils for de-humidifying the air.

28. The system according to Claim 20 wherein the fan of each air handling system is located in a housing at one end of the respective bench.

20 29/30. The system according to Claim 20 wherein the duct of each air handling system is arranged to communicate with exterior air at one sidewall of the exterior wall structure at one end of the respective bench.

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~~31.~~ A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within the interior and comprising:

5 a bench arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; and

an air handling system comprising:

an air intake plenum having at least one air intake,

10 a fan connected to the plenum,

an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

and at least one air conditioning component for conditioning the air transported from the plenum to the duct by the fan;

15 wherein the fan is mounted in a fan housing with the fan housing at one end of the bench arranged to be located at one exterior wall of the greenhouse and wherein the fan housing has a connection for exterior air arranged to extend through said one exterior wall.

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~~32.~~ The system according to Claim 31 wherein the bench has at

20 least a part of the plenum mounted underneath the bench as at least a part of the support therefor.

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32. The system according to Claim 32 wherein the plenum under the bench defines a rectangular housing arranged for supporting a horizontal bench top.

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33. The system according to Claim 33 wherein the horizontal bench top is slidable side to side across the housing.

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34. The system according to Claim 33 wherein the horizontal bench top is tiltable about a horizontal axis longitudinally along the housing

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35. The system according to Claim 31 wherein the duct includes a vertical duct section at one end of the respective bench.

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36. The system according to Claim 36 wherein the duct includes a horizontal discharge duct section connected to the vertical duct section and extending over the bench for discharging air downwardly onto the bench.

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37. A climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within the interior and comprising:

a bench arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior;

an air handling system comprising:

an air intake plenum having at least one air intake,

a fan connected to the plenum,

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an outlet duct connected to the fan having an air outlet for expelling air from the duct into the interior of the greenhouse,

and at least one air conditioning component for conditioning the air transported from the plenum to the duct by the fan;

5 the plenum including at least a part thereof mounted underneath the bench and the duct including at least a part thereof above the bench for discharge of the conditioned air downwardly onto the bench.

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10 ³⁸₃₉. The system according to Claim 38 including a plurality of benches wherein each bench has associated therewith a respective plenum and a respective fan and wherein at least a part of the plenum associated therewith is mounted underneath the bench and forming at least a part of a support for the bench.

³⁹₄₀. The system according to Claim 39 wherein the part of the plenum under the bench defines a rectangular housing arranged for supporting a
15 horizontal bench top.

⁴⁰₄₁. The system according to Claim 40 wherein the horizontal bench top is slidable side to side across the housing.

⁴¹₄₂. The system according to Claim 40 wherein the horizontal bench top is tiltable about a horizontal axis longitudinally along the housing

20 ⁴²₄₃. The system according to Claim 38 wherein the duct includes a vertical duct section at one end of the bench.

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~~44~~. The system according to Claim 43 wherein the includes a horizontal discharge duct section connected to the vertical duct section and extending over the bench for discharging the air therefrom downwardly onto the bench.

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The system according to Claim 44 wherein the horizontal duct section comprises a flexible tube shaped to form an elliptical cross section which is wider than it is high.

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The system according to Claim 38 wherein there is provided an air flow connection which is arranged to communicate with one sidewall of the exterior wall structure at one end of the bench.

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